

WHAT IS CLAIMED IS:

1. A constant voltage generating circuit comprising:
a group of first bipolar transistors including n (an
5 integer; $2 \leq n$) first bipolar transistors;
a group of second bipolar transistors including n second
bipolar transistors each having a larger emitter area than
the first bipolar transistor;
differential voltage generating means for generating
10 a differential voltage between a voltage equal to a sum
of base emitter voltages of said n first bipolar transistors
and a sum of base emitter voltages of said n second bipolar
transistors; and
voltage amplification adding means for amplifying said
15 differential voltage and adding the amplified voltage to
the base emitter voltage of one of said group of second
bipolar transistors to output a constant voltage
independent of temperature.
- 20 2. The constant voltage generating circuit as claimed in
claim 1, wherein said differential voltage generating means
includes a differential amplifier, and an offset voltage
at said differential amplifier in input equivalent has a
primary temperature characteristic.
- 25 3. A constant voltage generating circuit comprising:

a group of first bipolar transistors including n (an integer; $2 \leq n$) first bipolar transistors;

a group of second bipolar transistors including n second bipolar transistors each having a larger emitter area than
5 the first bipolar transistor;

differential voltage generating means for generating a differential voltage between a voltage equal to a sum of base emitter voltages of said n first bipolar transistors and a sum of base emitter voltages of said n second bipolar
10 transistors; and

voltage amplification adding means including a differential amplifier in which an offset voltage in input equivalent has a primary temperature characteristic, for amplifying said differential voltage and adding the
15 amplified voltage to the sum of the base emitter voltages of said group of second bipolar transistors to output a constant voltage independent of temperature.

4. A constant voltage generating circuit comprising:

20 a group of first pnp transistors including n (an integer; $2 \leq n$) first pnp transistors, a collector of each of the first pnp transistors being grounded, a base of a first of the group of first pnp transistors being grounded, a base of a k (an integer; $2 \leq k \leq n$)-th of the group of first
25 pnp transistors being connected to an emitter of a $(k-1)$ -th of the group of first pnp transistors;

a group of second pnp transistors including n second pnp transistors each having a larger emitter area than the first pnp transistor, an collector of each of the group of second pnp transistors being grounded, a base of a first of the group of second pnp transistors being grounded, a collector of each of the group of second pnp transistors being grounded, a base of a k -th of the group of second pnp transistors except a second of the group of second pnp transistors being connected to an emitter of a $(k-1)$ -th of the group of second pnp transistors;

current sources connected to the respective emitters of said group of first pnp transistors and the respective emitters of said group of second pnp transistors except the first of the group of second pnp transistors to supply currents to the respective pnp transistors of said groups of first and second pnp transistors, two resistors being connected in series between the emitter of said first of the group of second pnp transistors and the corresponding power source, a connection point between the two resistors being connected to the base of said second of the group of second pnp transistors; and

current control means including a first input terminal to which the emitter of an n -th of the first pnp transistors and a second input terminal to which the emitter of an n -th of the second pnp transistors, the current control means controlling currents from the current sources by outputting a control signal that controls the currents from said current

sources so that a potential at said first input terminal and a potential at said second input terminal are the same.

5. A constant voltage generating circuit comprising:

5 a group of first npn transistors including n (an integer; $2 \leq n$) first npn transistors, a base and a collector of each of the first npn transistors being connected together, an emitter of a first of the first npn transistors being grounded, an emitter of a k (an integer; $2 \leq k \leq n$)-th of the
10 first npn transistors being connected to a collector of a $(k-1)$ -th of the first npn transistors;

a group of second npn transistors including n second npn transistors each having a larger emitter area than the first npn transistor, a base and a collector of each of
15 said second npn transistors being connected together, an emitter of a first of the second npn transistors being grounded, an emitter of a k (an integer; $2 \leq k \leq n$)-th of the second npn transistors except a second of the second npn transistors being connected to a collector of a $(k-1)$ -th
20 of the second npn transistors;

current sources connected to the collector of an n -th of said group of first npn transistors and the collector of an n -th the group of second npn transistors to supply currents to the respective npn transistors of the groups
25 of first and second npn transistors, said first of the second npn transistors being connected to the corresponding current source via two resistors connected in series, a

connection point between the two resistors being connected to the emitter of said second of the group of second npn transistors; and

current control means including a first input terminal
5 to which the collector of said n-th of the first npn transistors and a second input terminal to which the collector of said n-th of the second npn transistors, the current control means controlling currents from said current sources by outputting a control signal that controls
10 the currents from said current sources so that a potential at the first input terminal and a potential at the second input terminal are the same.

6. The constant voltage generating circuit as claimed in
15 claim 4 or 5, wherein said differential voltage generating means includes a differential amplifier, and an offset voltage at said differential amplifier in input equivalent has a primary temperature characteristic.

20 7. A constant voltage generating circuit comprising:
a group of first pnp transistors including n (an integer; $2 \leq n$) first pnp transistors, a collector of each of the first pnp transistors being grounded, a base of a first of the first pnp transistors being grounded, a base
25 of a k (an integer; $2 \leq k \leq n$)-th of the first pnp transistors being connected to an emitter of a (k-1)-th of the first pnp transistors;

a group of second pnp transistors including n second pnp transistors each having a larger emitter area than the first pnp transistor, an collector of each of the second pnp transistors being grounded, a base of a first of the
5 second pnp transistors being grounded, a base of a k-th of the second pnp transistors being connected to an emitter of a (k-1)-th of the second pnp transistors;

current sources connected to the respective emitters of said group of first pnp transistors and the respective
10 emitters of said group of second pnp transistors except an n-th of the group of second pnp transistors to supply currents to the respective pnp transistors of said groups of first and second pnp transistors, two resistors being connected in series between the emitter of said n-th of
15 the second pnp transistors and the corresponding power source; and

current control means including a first input terminal to which the emitter of an n-th of the first pnp transistors, a second input terminal to which a connection point between
20 said two resistors connected in series is connected, and a differential amplifier, the current control means controlling currents from said current sources by outputting a control signal that controls the currents from said current sources so that a potential at said first input
25 terminal and a potential at said second input terminal are the same, an offset voltage at the differential amplifier

in input equivalent having a primary temperature characteristic.

8. A constant voltage generating circuit comprising:

5 a group of first npn transistors including n (an integer; $2 \leq n$) first npn transistors, a base and a collector of each of the first npn transistors being connected together, an emitter of a first of the first npn transistors being grounded, an emitter of a k (an integer; $2 \leq k \leq n$)-th of the
10 first npn transistors being connected to a collector of a $(k-1)$ -th of the first npn transistors;

a group of second npn transistors including n second npn transistors each having a larger emitter area than the first npn transistor, a base and a collector of each of
15 the second npn transistors being connected together, an emitter of a first of the second npn transistors being grounded, an emitter of a k (an integer; $2 \leq k \leq n$)-th of the second npn transistors being connected to a collector of a $(k-1)$ -th of the second npn transistors;

20 a current source connected to the collector of an n -th of the group of first npn transistors to supply a current to each of the groups of first and second npn transistors, two resistors being connected in series between the current source and an n -th of the second npn transistors; and

25 current control means comprising a first input terminal including a differential amplifier in which an offset voltage in input equivalent has a primary temperature

characteristic, the n-th of the first npn transistors being connected to the first input terminal, and a second input terminal to which a connection point between said two resistors connected in series is connected, the current control means controlling a current from said current source by outputting a control signal that controls the current from said current source so that a potential at said first input terminal and a potential at said second input terminal are the same.

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9. The constant voltage generating circuit as claimed in any of claims 4 or 5, wherein said differential voltage generating means includes a differential amplifier, and an offset voltage at said differential amplifier in input equivalent has a primary temperature characteristic,

wherein said differential amplifier has a differential pair including a first npn transistor and a second npn transistor having a larger emitter area than the first npn transistor, and a current source that supplies a current to said differential pair,

wherein said differential pair includes a first and second input terminals, said first input terminal is a base of said first npn transistor, and said second input terminal is a base of said second npn transistor, and

wherein an emitter of said first npn transistor is connected to said current source, and an emitter of said second npn transistor is connected to said current source,

the emitter of said first npn transistor being connected to the emitter of said second npn transistor.

10. The constant voltage generating circuit as claimed in
5 any of claims 7 or 8, wherein said differential amplifier has a differential pair including a first npn transistor and a second npn transistor having a larger emitter area than the first npn transistor, and a current source that supplies a current to said differential pair,

10 wherein said differential pair includes a first and second input terminals, said first input terminal is a base of said first npn transistor, and said second input terminal is a base of said second npn transistor, and

wherein an emitter of said first npn transistor is
15 connected to said current source, and an emitter of said second npn transistor is connected to said current source, the emitter of said first npn transistor being connected to the emitter of said second npn transistor.

20 11. The constant voltage generating circuit as claimed in claim 7 or 8, wherein said differential amplifier has a differential pair including a first npn transistor and a second npn transistor having a larger emitter area than the first npn transistor, and a current source that supplies
25 a current to said differential pair, and said differential amplifier has a group of first npn transistors including m (an integer; $1 \leq m$) first npn transistors and a group of

second npn transistors including m second npn transistors each having a larger emitter area than the first npn transistor,

wherein said differential pair includes a first and
5 second input terminals, said first input terminal is a base of said first npn transistor, and said second input terminal is a base of said second npn transistor, and

wherein an emitter of said first npn transistor is connected to said current source, and an emitter of said
10 second npn transistor is connected to said current source, the emitter of said first npn transistor being connected to the emitter of said second npn transistor,

wherein a base and a collector of each of said group of first npn transistors are connected together, a collector
15 of k (an integer; $2 \leq k \leq m$)-th of the group of first npn transistor is connected to an emitter of a (k-1)-th of the group of first npn transistors, the collector of a first of said group of first npn transistors is connected to the emitter of the first npn transistor constituting said
20 differential pair, and the emitter of an m-th of said group of first npn transistors is connected to said current source, and

wherein a base and a collector of each of said group of second npn transistors are connected together, a
25 collector of a k (an integer; $2 \leq k \leq m$)-th of the group of second npn transistor is connected to an emitter of a (k-1)-th of the group of second npn transistors, the collector of

a first of said group of second npn transistors is connected to the emitter of the second npn transistor constituting the differential pair, and the emitter of an m-th of said group of second npn transistors is connected to said current
5 source.